

CLAIMS

1. A transmission directional antenna control system, in which a base station performs the directional control of transmission array antenna elements according to information from a mobile station,

5 said transmission directional antenna control system, providing in the base station:

means for forming a transmission multi-beam corresponding to a spread code selected by said mobile station based on a signal spread by different spread codes transmitted from said transmission array antenna elements; and

10 means for forming an arbitrary multi-beam other than the transmission multi-beam selected by said mobile station.

2. The transmission directional antenna control system according to claim 1, wherein each of signals for SIR measurement is transmitted by different spread codes and different beams in a downward transmission to said mobile station from said base station, and a signal of the spread code having good receiving characteristics obtained by measuring said SIR by said mobile station is notified to said base station, and said base station transmits data by a beam corresponding to the spread code notified from said mobile station.

5 3. The transmission directional antenna control system according to claim 1 or claim 2, providing in said base station:

a plurality of receiving array antenna elements;

a plurality of transmission array antenna elements;

5 means for weight-synthesizing each of received signals from said receiving array antenna elements by a preset weight coefficient and for generating a receiving multi-beam;

means for detecting each of the power values of said receiving
multi-beam and receiving information from said mobile station by the receiving
10 multi-beam having the maximum power;

means for generating a transmission weight coefficient for transmission
data according to information received from said mobile station for each
transmission multi-beam corresponding to each of the plurality of transmission
array antenna elements;

15 means for generating the transmission weight coefficient of an arbitrary
multi-beam other than the multi-beam in which said transmission weight is
generated; and

20 means for generating said transmission multi-beam by multiplying these
transmission weight coefficients by said transmission data and spreading these
transmission multi-beams by each of the different spread codes to be supplied
to the corresponding transmission array antenna elements,

wherein said base station performs the directional control of said
transmission array antenna elements according to information from said mobile
station.

25 4. The transmission antenna directional control system according to claim 1
or claim 2, providing in said base station:

a plurality of receiving array antenna elements;

a plurality of transmission array antenna elements;

5 means for generating a receiver beam by adaptively determining an
arrival direction of each of received signals from said receiving array antenna
elements and giving a weight thereto;

means for receiving information from said mobile station by the formed
receiving beam;

10 means for generating a transmission weight coefficient for transmission data that corresponds to information received from said mobile station for each transmission beam corresponding to each of the plurality of transmission array antenna elements;

15 means for generating the transmission weight coefficient of an arbitrary multi-beam other than the transmission beam in which said transmission weight coefficient is generated; and

20 means for generating said transmission beam by multiplying these transmission weight coefficients by said transmission data and spreading these transmission multi-beams by each of the different spread codes to be supplied to the corresponding transmission array antenna elements,

wherein said base station performs directional control of said transmission array antenna elements according to information from said mobile station.

5. A base station performing the directional control of transmission array antenna elements according to information from a mobile station, comprising:

means for forming a transmission multi-beam corresponding to a spread code selected by said mobile station based on a signal spread by different

5 spread codes transmitted from said transmission array antenna elements; and

means for forming an arbitrary multi-beam other than the transmission multi-beam selected by said mobile station.

6. The base station according to claim 5, wherein each of the signals for SIR measurement is transmitted by different spread codes and different beams in a downward transmission to said mobile station, and when a signal of the spread code and which has good receiving characteristics is notified to said

- 5 base station, the data is transmitted by a beam corresponding to the spread code.
7. The base station according to claim 5 or claim 6, comprising:
- a plurality of receiving array antenna elements;
 - a plurality of transmission array antenna elements;
 - means for weight-synthesizing each of the received signals from said
- 5 receiving array antenna elements by a preset weight coefficient and for generating a receiving multi-beam;
- means for detecting each of the power values of said receiving multi-beam and receiving information from said mobile station by the receiving multi-beam having maximum power;
- 10 means for generating the transmission weight coefficient for the transmission data according to information received from said mobile station for each transmission multi-beam corresponding to each of the plurality of transmission array antenna elements;
- means for generating the transmission weight coefficient of an arbitrary
- 15 multi-beam other than the multi-beam in which said transmission weight coefficient is generated; and
- means for generating said transmission multi-beam by multiplying these transmission weight coefficients by said transmission data and spreading these transmission multi-beams by each of the different spread codes to be supplied
- 20 to the corresponding transmission array antenna elements,
- wherein said base station performs the directional control of said transmission array antenna elements according to information from said mobile station.

8. The base station according to claim 5 or claim 6, comprising:
 - a plurality of receiving array antenna elements;
 - a plurality of transmission array antenna elements;
 - means for forming a receiving beam by adaptively determining an arrival direction of each of the received signals from said receiving array antenna elements and giving a weight thereto;
 - means for receiving information from said mobile station by the formed receiving beam;
 - means for generating the transmission weight coefficient for transmission data corresponding to information received from said mobile station for each transmission beam corresponding to each of the plurality of transmission array antenna elements; and
 - means for generating the transmission weight coefficient of an arbitrary multi-beam other than the transmission beam in which said transmission weight coefficient is generated; and
 - means for generating said transmission beam by multiplying these transmission weight coefficients by said transmission data and spreading these transmission multi-beams by each of the different spread codes to be supplied to the corresponding transmission array antenna elements,
 - wherein said base station performs the directional control of said transmission array antenna elements according to information from said mobile station.

9. A transmission directional antenna control method in which a base station performs the directional control of transmission array antenna elements according to information from a mobile station, said transmission direction antenna control method, comprising the steps of:

5 forming a transmission multi-beam corresponding to the spread code selected by said mobile station based on a signal spread by different spread codes transmitted from said transmission array antenna elements performed by said base station side; and

10 forming an arbitrary multi-beam other than the transmission multi-beam selected by said mobile station.

10. The transmission directional antenna control method according to claim 9, wherein each of the signals for SIR measurement is transmitted by different spread codes and different beams in a downward transmission to said mobile station from said base station, and a signal that is spread by the spread code 5 and which has good receiving characteristics obtained by measuring said SIR by said mobile station is notified to said base station, wherein said base station transmits data by a beam corresponding to the spread code notified from said mobile station.

11. The transmission antenna directional control method according to claim 9 or claim 10, providing in said base station:

a plurality of receiving array antenna elements;

a plurality of transmission array antenna elements;

5 means for weight-synthesizing each of the received signals from said receiving array antenna elements by a preset weight coefficient and for generating a receiving multi-beam;

means for detecting each of the power of values receiving multi-beams and for receiving information from said mobile station by the receiving 10 multi-beam having the maximum power;

means for generating the transmission weight coefficient for transmission data according to information received from said mobile station for each transmission multi-beam corresponding to each of the plurality of transmission array antenna elements;

15 means for generating the transmission weight coefficient of an arbitrary multi-beam other than the multi-beam in which said transmission weight coefficient is generated, and

means for multiplying these transmission weight coefficients by said transmission data to generate said transmission multi-beam and spreading
20 these transmission multi-beams by each of the different spread codes to be supplied to the corresponding transmission array antenna elements,

wherein said base station performs the directional control of said transmission array antenna elements according to information from said mobile station.

25 12. The transmission antenna directional control method according to claim 9 or claim 10, comprising:

a plurality of receiving array antenna elements;

a plurality of transmission array antenna elements;

5 means for forming a receiver beam by adaptively determining an arrival direction of each of received signals from said receiving array antenna elements and giving a weight thereto;

means for receiving information from said mobile station by the formed receiver beams;

10 means for generating the transmission weight coefficient for transmission data corresponding to information received from said mobile station for each

transmission beam corresponding to each of the plurality of transmission array antenna elements; and

15 means for generating the transmission weight coefficient of an arbitrary multi-beam other than the transmission beam in which said transmission weight beam is generated, and

means for generating said transmission beam by multiplying these transmission weight coefficients by said transmission data and spreading these transmission multi-beams by each of the different spread codes to be supplied
20 to the corresponding transmission array antenna elements,

wherein said base station performs the directional control of said transmission array antenna elements according to information from said mobile station.